Island Acres

Aerated Lagoon

Edge of wetland cell showing plant diversity

Wetland cell

Island Acres Facility Statistics	
Nearest Town:	**Grand Junction**
County:	**Mesa**
River Basin:	**Colorado River**
Receiving Water Body:	**Non-discharging**
Year Online:	**1995**
Population:	**380**
Elevation (feet):	**5763**
Design Flow (mgd):	**0.020**
Average Flow (mgd):	**0.015**
Size (acres):	**1**

Facility Description

The total treatment process consists of an initial sedimentation tank, primary treatment with an aerated lagoon, and final treatment in a zero discharge constructed wetlands marsh. Accumulated sludge in the sediment tank is removed and disposed of off-site. The aerated lagoons are designed to remove a minimum of 50% of the BOD at maximum flow rates. The lagoons are lined with a synthetic liner and equipped with Aeromix system Tornado Aeration Units.

Background Information

Island Acres State Recreation Area is located 15 miles east of Grand Junction, Colorado on Interstate 70. An expansion to the park offered full service hook-ups for campsites, including shower and laundry facilities. Prior to the expansion the only wastewater treatment facilities within the Park were individual disposal systems for the Park maintenance building and the residence building. Only vault toilets were available to

the public. The expansion added 66 full service campsites with related facilities to the Park's 34 unimproved overnight campsites.

Several treatment options were ruled out at this site. Leach fields were ruled out because of the water table in the aquifer, the closeness of the Colorado River, and the swimming and fishing lakes being fed by the aquifer. The Division of Parks has used package treatment plants at other locations and had bad experiences. In addition, both of the above solutions are discharge systems; and a primary treatment goal was to have a zero discharge system. This left two treatment options for further consider evaporative lagoons or constructed wetlands. Of these two alternatives, constructed wetlands were more desirable to the Division of Parks for the following reasons:

- Ability to accommodate extreme flow variations
- Ease of operation and maintenance
- Compatibility with Park operations
- Potential benefits
- Familiarity.

The Division of Parks currently has two wetland systems in the Western Region at Highline Lake and Ridgeway Reservoir State Parks.

Energy Analysis

The primary energy consumers at this site are the aerators and mixers in the lagoon. Flow through the wetland is achieved by gravity.

Wetland Design

Design Methods

The peak loadings for 100% usage and occupancy at complete buildout are 20,000 gpd with a corresponding BOD of 72 #/day. Wastewater effluent is measured with a 60-degree V-notched trapezoidal flume. Wastewater discharges from the sewer system into a sedimentation / grit chamber that consists of a 4000 gallon septic tank. This provides 3.6 to 9.6 hours of detention, at maximum and average daily flows. The aeration basin consists of a single cell with a total capacity of 200,000 gallons. The basin is rectangular with rounded corners. Aeration and mixing are provide by two 1.5 hp Aeromix System Tornado Aerators. The system is designed to maintain a minimum of 2.0 mg/l of dissolved oxygen and supply 1.5 lbs. of oxygen for each pound of BOD. The Effluent is conveyed via a pipeline from the aerated lagoon to the wetland. The two major design components for the wetlands are climatic date and evapotranspiration rates to size the wetland. The second component is the hydraulic and organic loading rate.

Objectives

The main treatment goals of the constructed wetland marsh are to complete the biological treatment of the wastewater and to dispose of the excess fluids through an evapotranspiration process.

Size

The wetland system is comprised of a single 3.90 surface flow cell. Average flows are well below design flows. This results in a transition area in the wetland from inundated soils to varying moisture levels. This

'over-sizing' in a wetland boundary similar to a natural wetland. Changes in vegetation dominance are evident as the flow and nutrient load of the wastewater decrease along the flowpath.

Shape

The wetland cell is generally rectangular, with some irregular borders necessary in order to fit within the site.

Hydraulics

Discharge from the lagoon system is discharged through a pvc pipe to a river rock lined corner of the wetland cell. The wetland is sloped so that the flow is distributed diagonally across the wetland cell. This system is an evaporative system. Plumbing is available to collect effluent at the outlet end of the wetland, if discharge is ever required.

Treatment Goals

Permitted Discharge Limitations	
Oil and Grease:	**10 mg/l (Daily Max)**
$CBOD_5$:	**25 mg/l (30-day ave)**
BOD_5 Removal:	**85%**
TSS:	**105 mg/l (30-day ave)**
PH, su (min – max)	**6.5 – 9.0 (Daily Max)**
Chlorine Residual:	**0.5 mg/l (Daily Max)**
Fecal Coliform Bacteria:	**6,000 organisms per 100 ml (Daily Max)**

Water Quality Data

This wastewater treatment facility operates under a groundwater permit. Since it is not discharging into a surface water, monthly discharge monitoring reports are not required. Water quality data is not available for this site.

General Ecological Setting

Island Acres is the eastern-most unit of the Colorado River State Park, a 20-mile long reach of the Colorado River. Ecologically, uplands support desert shrublands dominated by species such as big sagebrush and greasewood. Big sagebrush communities are well represented, occupying high terraces along the river. Much of the landscape along the river has been altered to support agricultural crops, flood control, and highway construction. Within the river corridor, diverse wetland and riparian communities occur on islands, point bars, and along the banks.

Cell Vegetation

The Island Acres wetland has two plant communities. Plant community 1, which represents 85 percent of the total cell area, is dominated by cattail (*Typha latifolia*). Other dominant species include softstem bulrush (*Scirpus tabernaemontana*), creeping spikerush (*Eleocharis palustris*), and Torrey's rush (*Juncus torreyi*). Plant community 2, 15 percent of the cell, is dominated by short-awn foxtail (*Alopecurus aequalis*).

Planting/Seeding

The constructed wetland at construction was planted with cattail.

Weeds

Tamarisk or saltcedar (*Tamarix chinensis*), a noxious weed, is prolific along the Colorado River reach adjacent to Island Acres and saplings of the escaped ornamental are present in the wetland. Tamarisk is a facultative phreatophyte, i.e., it can draw water from underground sources but once established it can survive without access to ground water. It consumes large quantities of water, possibly more than woody native plant species that occupy similar habitats.

Maintenance Issues

Tamarisk is a maintenance concern for park staff and is commonly controlled in riparian areas and wetlands because of its potential to displace native vegetation and its lower value as wildlife habitat.

Wildlife

The vegetative structural diversity and subsequent wildlife habitat value are moderate. When viewed at the landscape level, the Island Acres constructed wetland has not added significantly to the acreage of suitable, adequately isolated habitat for waterfowl and other wildlife along the reach of the Colorado River. Proximity to a public campground and Interstate 70 will generally preclude specialist species from using the wetland. Species for which habitat is available include various songbirds, waterfowl, muskrat, deer mouse, raccoon, coyote, and mule deer.

Wetland Biodiversity Functional Assessment

The general wildlife habitat, habitat diversity, and uniqueness of the Island Acres constructed wetland all rated moderate to low. Total functional points were 52% of the total possible for this wetland, and it was rated as a category III wetland.

Wetland Biodiversity Functional Assessment.

Function and Value Variables	Functional Points (0.1 to 1)	Possible Points
General Wildlife Habitat	0.5 (mod.)	1
General Fish / Aquatic Habitat	0.0	1
Production Export / Food Chain Support	0.7 (mod.)	1
Habitat Diversity	0.2 (low)	1

Wetland Biodiversity Functional Assessment.		
Function and Value Variables	**Functional Points (0.1 to 1)**	**Possible Points**
Uniqueness	**0.2 (low)**	**1**
Total Points	**2.6 (52%)**	**5**
Wetland Category (I, II, III, or IV)	**III**	

Human Use

The wastewater wetland is part of a restricted public access area, and has never been used for educational purposes. This wetland has moderate aesthetic value. The aesthetic value of this wetland is limited because of its proximity to Interstate 70, but its location along the Colorado River and its location in a state park give it aesthetic and recreational value.

Overall Site Comments

This wetland functions effectively in the treatment of wastewater and it also has healthy vegetation cover. It has value to the public because it is located in a state park and can be used for public education and is an excellent conservation measure for the park.